WHAT IS CLAIMED IS:

1. An omnidirectional two dimensional imaging apparatus comprising:

(a) A truncated convex reflective mirror that reflects an image of substantially hemispherical scene;

(b) An imaging sensor means positioned to receive said omnidirectional images;

whereby images with wide field-of-view of substantially hemispherical scene from a single viewpoint can be obtained.

2. An apparatus as recited in claim 1, wherein the reflective mirror is a substantially hyperbolic reflective mirror whereby the substantially hemispherical omnidirectional images with single viewing center can be obtained.

3. An omnidirectional stereo camera apparatus comprising of a pair of optically aligned omnidirectional two dimensional imaging systems as recited in claim 1 whereby the stereo omnidirectional images can be obtained.

4. An omnidirectional stereo camera apparatus comprising of a pair of optically aligned omnidirectional two dimensional imaging systems as recited in claim 2 whereby the stereo omnidirectional images can be obtained.

5. An omnidirectional three dimensional camera apparatus comprising:

(a) An omnidirectional two dimensional imaging systems as recited in claim 1;

(b) An omnidirectional structured light projection means;

whereby the three dimensional measurement of the surrounding objects in the omnidirectional scene can be obtained.

6. An omnidirectional three dimensional camera apparatus comprising:

(c) An omnidirectional two dimensional imaging systems as recited in claim 2;

(d) An omnidirectional structured light projection means;

whereby the three dimensional measurement of the surrounding objects in the omnidirectional scene can be obtained.

7. An improved imaging apparatus for generating a two dimensional image, comprising:

a substantially hyperbolic reflective mirror configured to satisfy an optical single viewpoint constraint for reflecting a scene;

an image sensor responsive to said reflective mirror and that generates two dimensional image data signals; and

a controller coupled to said image sensor to control a display of two dimensional object scenes corresponding to said image data signals.

8. The improved imaging apparatus of claim 7, wherein hemispherical image data signals generated by said sensor are projected from a single virtual viewing point at the focal center of said hyperbolic mirror.

9. The improved imaging apparatus of claim 7, wherein said substantially hyperbolic reflective mirror is a substantially convex mirror and wherein said image data signals generated by said image sensor are projected from a single virtual viewing point at the focal center of said convex mirror.

10. An omnidirectional stereo imaging system, comprising:

a first camera that generates hemispherical image data signals;

a first substantially hyperbolic reflective mirror optically associated with said first signal generator such that said first camera views objects in an entire hemispherical field of view from a single virtual viewpoint at the focal center of said first reflective mirror;

a second camera that generates a second set of hemispherical image data signals;

a second substantially hyperbolic reflective mirror optically associated with said second camera such that said camera views objects in an entire hemispherical field of view from a single virtual viewpoint at the focal center of said second reflective mirror; and

a data generator responsive to said hemispherical image data signals from said first and second camera for generating three-dimensional data for objects in said hemispherical fields of view of said first and second reflective mirror.

11. The system of claim 10, wherein said first and second cameras point in opposite directions.

12. The system of claim 10, wherein image data signals correspond to acquiring a field of view simultaneously covering 360 degrees of viewing angle.

13. The system of claim 10, wherein a focal center of said first camera and said first hyperbolic reflective mirror are at focal points of a parabolic curve.

14. The system of claim 13, wherein a focal center of said second camera and said second hyperbolic reflective mirror are at focal points of a second parabolic curve.

15. The system of claim 14, wherein said parabolic curve and said second parabolic curve are substantially similar.

16. An omnidirectional two dimensional imaging system, comprising:

a reflective surface configured to reflect light rays such that extensions of said light rays are substantially coincident on a single viewing point; and

an imaging system configured to cover the entire surface of said omni-mirror.

17. The system of claim 16, wherein said reflective surface comprises a substantially hyperbolic mirror.

18. The system of claim 17, wherein said hyperbolic mirror first and second focal points in which said single viewing point is at said first focal point and a focal point of said imaging system is at said second focal point.

19. The system of claim 17, wherein said imaging system comprises a camera.

20. The system of claim 16, wherein said imaging system is configured to capture an image through a 360 degree viewing angle.

21. An omnidirectional stereo imaging system, comprising:

a first omnidirectional imaging assembly having a first imaging device and a first omni-mirror wherein a viewing point of said omni-mirror and a focal point of said imaging device are disposed on focal points of a hyperbolic curve;

a second omnidirectional imaging assembly having a second imaging device and a second omni-mirror wherein a viewing point of said omni-mirror and a focal point of said imaging device are disposed on focal points of a hyperbolic curve

wherein focal centers of said first and second omni-mirrors and focal points of said first and second imaging devices are substantially coaxial; and

wherein said virtual viewing points are separated by a predetermined distance.

22. The system of claim 21, wherein said imaging systems comprise first and second cameras that generate hemispherical image data signals.

23. The system of claim 22, further comprising a data generator responsive to said hemispherical image data signals from said first and second imaging devices for generating three-dimensional data for objects in fields of view of said first and second omni-mirrors.

24. The system of claim 22, wherein said first omni-mirror comprises a substantially hyperbolic reflective mirror optically associated with said first imaging device such that said first imaging views objects through a 360 degree field of view from a first virtual viewpoint at a focal center of said first camera and said second omni-mirror comprises

a second substantially hyperbolic reflective mirror optically associated with said second imaging device such that said second imaging device views objects in through a 360 degree field of view from a second virtual viewpoint at the focal center of said second reflective mirror.

25. The system of claim 21, wherein said first and second imaging devices comprise cameras.